

# A new genus, *Denhamiana* gen. nov., and two new species of land snail from inland central Queensland (Eupulmonata, Camaenidae)

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Citation: Stanisic, J. 2013 10 10: A new genus, *Denhamiana* gen. nov., and two new species of land snail from inland central Queensland (Eupulmonata, Camaenidae). *Memoirs of the Queensland Museum - Nature* 58: 367–374. Brisbane. ISSN 0079-8835. Accepted: 17 July 2013.

## ABSTRACT

*Denhamiana* gen. nov. is established for at least two new species of camaenid land snail from inland mid-eastern Queensland. *D. laetifica* sp. nov. occurs in an area stretching from just west of Eungella, southward through the Denham Range to Pine Mountain, south-east of Nebo, while *D. leichhardti* sp. nov. is hitherto known only from the more westerly Carborough Range. A third species ?*Denhamiana* sp. nov. 'Dipperu' is proposed awaiting more specimens. These camaenids are characterised by a combination of morphological features including a large helicoid shell with bold dark brown spiral bands and dark brown apertural lip, a closed umbilicus and a reproductive system featuring a reduced epiphallus, a short vestigial epiphallic flagellum and a cylindrical, sheathed penis that internally has a penial stimulator and triangular verge. Molecular study of one of the species indicates that the genus is a sister group to *Bentosites* Iredale, 1933 whose species occur in coastal and sub-coastal rainforests in localities between Ayr and Sarina, mid-eastern Queensland. □ *Denhamiana* gen.nov., Eupulmonata, Camaenidae, systematics, new species, Queensland, Australia.

The Camaenidae is one of the most speciose groups of land snails in Australia. The family is common in many parts of the continent apart from the south-west and has radiated prolifically in the rainforests of eastern Australia (Smith 1992; Solem 1998; Stanisic *et al.* 2010). Of particular note are the many large helicoid species (historically referred to as the hadroid radiation) that occur in this part of the continent particularly in the region between Bowen and Sarina in mid-eastern Queensland. Sixteen species of large banded camaenids are currently known from the region: *Bentosites* (5 species), *Marilynessa* (5 species), *Temporena* (3 species) and *Sphaerospira* (3 species) (Stanisic *et al.* 2010). However, all of these species occur chiefly in the wetter rainforests and drier vine forests and thickets of the coastal plain and ranges of the region, including some off-lying islands. *Denhamiana* gen. nov. represents the

first record of large, banded, helicoid snails from the inland vine thickets of sub-coastal central Queensland.

## MATERIALS AND METHODS

Material used in this study is held in the collections of the Queensland Museum (QMMO). Studies of shell characters were carried out on specimens in the museum's dry collection (RC) and anatomical studies were based on ethanol preserved samples (SC). Measurements of shell characters (height, diameter) were made using callipers with a precision of 0.01 mm. Whorl counts were made to the nearest 1/8 whorl. At least three representatives of each species from their respective type localities were dissected and studied using a WILD M5 stereo microscope with drawing apparatus in order

to confirm stability of reproductive structures. Classification follows Stanisic *et al.* (2010).

#### ABBREVIATIONS

Anatomy: BC, bursa copulatrix; DG, prostate; E, epiphallus; EC, epiphallic caecum; EP, epiphallic pore; GD, hermaphroditic duct; GG, albumen gland; GT, talon; P, penis; PP, penial pilaster; PRM, penial retractor muscle; PS, penial sheath; PSS, penial stimulator; PV, penial verge; UT, uterus; UV, free oviduct; V, vagina; VD, vas deferens; X, carrefour; Y, atrium.

General: Ck, creek; MEQ, mid-eastern Queensland; Mt, Mount; Mtn, mountain; mvf, microphyll vine forest; NP, National Park; Ra, range; Rd, road; rf, rainforest; sevt, semi-evergreen vine thicket.

#### SYSTEMATICS

Order EUPULMONATA

Superfamily HELICOIDEA

Family CAMAENIDAE

Genus *Denhamiana* gen. nov.

Type species. *Denhamiana laetifica* sp. nov., herein designated

**Etymology.** Named for the Denham Range.

**Description.** Shell large, globosely helicoid, yellowish-brown with prominent sub-sutural and supra-peripheral, dark brown bands and several narrower brown spiral bands on upper part of whorls, and one to several narrow brown spiral bands basally; latter part of body whorl with dark brown suffusion becoming more dense behind aperture and extending onto umbilical area; parietal callus shiny, suffused with brown; lip dark brown. Umbilicus closed. Reproductive system with reduced epiphallus, a tiny vestigial epiphallic flagellum and a cylindrical, sheathed penis that internally has a tongue-like penial stimulator and conical verge with the epiphallic pore situated at the base of the verge. Head wart present.

**Distribution and habitat.** From west of Eungella at Lake Eungella south through the

Denham Range to Dipperu NP, and west to the Carborough Range, mid-eastern Queensland; living in vine thickets on volcanically derived rocks.

Additional collecting in the Kerlong Range, located adjacent and south-west of the Carborough Range, may yet extend the distribution of the genus.

**Remarks.** *Denhamiana* gen. nov. exhibits a number of features that readily distinguish it from the other so-called hadroid genera of camaenids in eastern Australia. The large shell, striking shell colour of bold, dark brown spiral bands and dark brown suffusion behind the aperture on a yellowish brown background coupled with the unusual penial anatomy are a combination of characters not seen in any other eastern hadroid genus. In particular the development of a penial stimulator is unique among the large banded eastern Australian camaenids in which there is usually a reduced verge that is short and knob-like and occasionally a main central pilaster, but no stimulator. (Solem 1992; Stanisic unpub.).

*Denhamiana laetifica* sp. nov.

(Figs 1, 2; Table 1)

**Etymology.** From the Latin *laetifica* = delightful; a name chosen by Matthew Limbert, a student of Samford State School, Queensland and winner of a 'name the snail' competition.

**Preferred common name.** Denham Range Banded Snail.

**Material examined.** Holotype: QMMO68577, Denham Ra., c.2 km NNW Mt Robert, MEQ, (21°21'27"S, 148°28'59"E), vine thicket, S. Wright, 23.x.2000. Height of shell 30.53 mm; diameter 34.57 mm; H/D ratio 0.88.

**Paratypes:** All MEQ. QMMO36102, 7SC/62RC, Eungella Dam, c.2 km SSW, Eungella Dam - Mt Hillalong Rd, (21°10'S, 148°23'E), sevt, under rocks, J. Stanisic, D. & N. Potter, 21.v.1990; QMMO36234, 16SC/32RC, Dipperu NP, scrub S of Pine Mtn, Sarina - Clermont Rd, (21°46'30"S, 148°50'30"E), vine thicket, in logs and hollow trees, J. Stanisic, D. & N. Potter, 22.v.1990; QMMO54313, 10SC/19RC, Dipperu NP, at Pine Mtn, c.20 km SE Nebo, (21°44'45"S, 148°50'35"E), sevt/Araucaria/volcanics, under rocks and logs, J. Stanisic, D. Potter, G. Ingram, C. Eddie, 23.vii.1994.

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**Other material.** QMMO28519, 1RC, Eungella Dam, c.2 km SSW, Eungella Dam - Mt Hillalong Rd, (21°10'S, 148°23'E), sevt, under rocks, J. Stanistic, D. & N. Potter, 21.v.1990; QMMO35795, 2SC/6RC, Endeavour Ck, Upp Reaches, Clarke Ra, W of Mackay, (21°15'30"S, 148°37'30"E), riverine rainforest, under bark on logs, J. Stanistic, D. & N. Potter, 20.v.1990; QMMO35825, 4RC, Eungella, c.13.5 km SSE, Hazelwood Gorge, (21°14'30"S, 148°26'30"E), vine thicket, under rock, V. Kessner, 20.iii.1992; QMMO36097, 1RC, Eungella Dam, c.1.5 km E, on road to Eungella, W Mackay, (21°10'00"S, 148°23'30"E), rocky outcrop/Ficus, under rocks, J. Stanistic, D. & N. Potter, 21.v.1990; QMMO36230, 2RC, Denham Ra, Homevale - Mt Britton Rd, c.100 km SW Mackay, (21°26'S, 148°35'E), sevt, under rocks, J. Stanistic, D. & N. Potter, 21.v.1990; QMMO36238, 1RC, Sarina, SW at Beautrel Ck, Old Sarina - Marlborough Rd, (22°03'S, 148°59'E), remnant thicket, in logs, J. Stanistic, D. & N. Potter, 22.v.1990; QMMO59242, 7RC, Dipperu NP, at Pine Mtn, c.20 km SE Nebo, (21°45'00"S, 148°50'23"E), sevt/basalt, J. Stanistic, G. Ingram, 13.vii.1995; QMMO59382, 1RC, Dipperu NP, at Pine Mtn, c.20 km SE Nebo, (21°44'45"S, 148°50'35"E), sevt/Araucaria/volcanics, under rocks and logs, J. Stanistic, D. Potter, G. Ingram, C. Eddie, 23.vii.1994; QMMO61415, 5SC/5RC, Dipperu NP, at Pine Mtn, c.20 km SE Nebo, (21°44'45"S, 148°50'35"E), 630m, P. Couper, C. Hoskin, 24.iv.1998; QMMO64903, 1RC, Eungella Dam, W, (21°06'46"S, 148°18'13"E), remnant vine thicket, litter, J. Stanistic, 30.x.1998; QMMO66631, 1RC, Nebo, WNW in Denham Ra., (21°23'04"S, 148°20'31"E), softwood scrub, T. Kitchener, 15.xii.1999; QMMO69882, 1SC, Nebo, NW in Denham Ra, Mt Robert, (21°21'S, 148°29'00"E), 360 m, G. Monteith, D. Cook, 26.iii.2001; QMMO74652, 5RC, Mt Gotthardt Ra, c.5.5k NNE of Mt Cristoe, (21°23'38"S, 148°20'05"E), vine thicket, 400 m, under rocks and in litter, A. Pollock, W. McDonald, 29.vi.2004; QMMO74756, 4RC, Mt Gotthardt Ra., c.4.8k N of Mt Cristoe, (21°24'11"S, 148°19'04"E), vine thicket, 360 m, under logs in litter, A. Pollock, W. McDonald, 29.vi.2004; QMMO74757, 2RC, Mt Gotthardt Ra., c.5.8k NNE of Mt Cristoe, (21°23'45"S, 148°19'53"E), vine thicket, 400 m, under

logs in litter, A. Pollock, W. McDonald, 29.vi.2004; QMMO74764, 1RC, Denham Ra., c.2k NNW of Mt Robert, (21°21'44"S, 148°29'08"E), 360 m, A. Pollock, W. McDonald, 30.vi.2004; QMMO74789, 2RC juveniles, Mt Gotthardt Ra., c.4.8k N of Mt Cristoe, (21°24'11"S, 148°19'04"E), 360 m, under logs in litter, A. Pollock, W. McDonald, 29.vi.2004; QMMO76080, 1SC, Denham Ra, c.2k NNW of Mt Robert, (21°21'S, 148°29'E), 60 m, G. Monteith, D. Cook, 18.xii.2000.

**Diagnosis.** Shell large, yellowish-brown with prominent sub-sutural and supra-peripheral, dark brown bands and several narrower brown spiral bands on upper part of whorls, and one to several narrow brown spiral bands basally; latter part of body whorl with very prominent, dark brown suffusion behind aperture, extending onto umbilical area; parietal callus shiny, strongly suffused with brown; lip dark brown. Umbilicus closed. Reproductive system with reduced epiphallus, tiny vestigial epiphallic flagellum and a cylindrical, sheathed penis with short penial stimulator and conical verge; epiphallic pore situated laterally at base of verge.

**Description.** Shell large, globosely helicoid with 5 5/8-6 1/2 normally coiled whorls, rounded above and below the periphery, last descending in front; sutures weakly impressed. Apex and spire moderately to strongly elevated; colour yellowish brown with prominent sub-sutural and supra-peripheral, dark brown bands and several narrower brown spiral bands on upper part of the whorls, and one to several narrow brown spiral bands basally; latter part of body whorl with prominent dark brown suffusion behind aperture, extending onto umbilical area; parietal callus shiny, strongly suffused with



FIG. 1. *Denhamiana laetifica* sp. nov. Shell views, holotype QMMO68577. A, Dorsal; B, apertural; C, ventral. Shell diameter = 34.57 mm.

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